

What is claimed is

1. A network management system comprising:

an extensible markup language (XML) template in which the form of a command line interface (CLI) command supported by a network device is expressed in XML; and

5 a network management interface which converts the XML template into a tree-shaped internal data structure, and by providing a predetermined argument to the converted XML template, converts the XML template into a set of CLI commands that are to be transmitted to the network device.

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2. The network management system of claim 1, wherein the network management interface comprises:

an XML parser which converts the XML template into the tree-shaped internal data structure;

15 a materializer which provides a predetermined argument to the converted XML template and converts the XML template into the set of CLI commands;

a connection manager which transmits the converted CLI commands to the network device; and

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a result processor which determines whether the transmitted CLI commands are successfully executed and collects additional information.

3. The network management system of claim 1, wherein the network management interface is an X-CLI interface.

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4. The network management system of claim 1, wherein the network management interface and the network device are connected through a protocol which provides a virtual terminal function to the network device.

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5. The network management system of claim 1, wherein the XML template is described by using document type declaration (DTD) which is used to show

the list of tags forming an XML document and to list the attributes of respective tags.

6. The network management system of claim 5, wherein the XML template
5 comprises:

a first tag which is to indicate the possibility that a CLI tag appears in the XML document and the CLI tag includes subordinate CLI tags or character string data;

a second tag which is to specify the attributes of the CLI tag;

10 a third tag which indicates that the attributes specified by the second tag have character string data; and

a fourth tag which indicates the possibility that the attributes specified by the second tag are omitted.

15 7. The network management system of claim 6, wherein the attributes of the CLI tag specified by the second tag comprises:

a first attribute which is to identify a predetermined tag when a plurality of CLI tags exist at the same time;

a second attribute which is to actually indicate the CLI command;

20 a third attribute which is to display a prompt character string corresponding to the CLI command specified by the second attribute value, on a virtual terminal of the network device in order to transmit the CLI command;

a fourth attribute which indicates which prompt should be displayed on the virtual terminal of the network device after the CLI command is transmitted and executed;

25 a fifth attribute which specifies which character string is displayed on the virtual terminal of the network device when the result of executing the CLI command is a failure and determines whether the execution of the CLI command is a failure or a success; and

30 a sixth attribute which determines whether to execute a current CLI command when the execution of the previous CLI command is a failure.

8. The network management system of claim 7, wherein a CLI tag in which all the CLI tag attributes are omitted is a pure aggregation tag (PAT) in which subordinate CLI tags included in the PAT are capable of being materialized more than once.

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9. A network management method comprising:

(a) forming an extensible markup language (XML) template in which the form of a command line interface (CLI) command supported by a network device is expressed by the XML; and

10 (b) converting the XML template into a tree-shaped internal data structure, and by providing a predetermined argument to the converted XML template, converting the XML template into a set of CLI commands that are to be transmitted to the network device.

15 10. The network management method of claim 9, wherein the step (b) comprises:

(b-1) converting the XML template into the tree-shaped internal data structure;

20 (b-2) providing a predetermined argument to the converted XML template and converting the XML template into the set of CLI commands;

(b-3) transmitting the converted CLI commands to the network device; and

(b-4) determining whether the transmitted CLI commands are successfully executed and collecting additional information.

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11. The network management method of claim 9, wherein the network management interface is an X-CLI interface.

30 12. The network management method of claim 9, wherein the network management interface and the network device are connected through a protocol which provides a virtual terminal function to the network device.

13. The network management method of claim 9, wherein the XML template is described by using document type declaration (DTD) which is used to show the list of tags forming an XML document and to list the attributes of respective tags.

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14. The network management method of claim 13, wherein the XML template comprises:

10 a first tag which is to indicate the possibility that a CLI tag appears in the XML document and the CLI tag includes subordinate CLI tags or character string data;

a second tag which is to specify the attributes of the CLI tag;

15 a third tag which indicates that the attributes specified by the second tag have character string data; and

a fourth tag which indicates the possibility that the attributes specified by the second tag are omitted.

15. The network management method of claim 14, wherein the attributes of the CLI tag specified by the second tag comprises:

20 a first attribute which is to identify a predetermined tag when a plurality of CLI tags exist at the same time;

a second attribute which is to actually indicate the CLI command;

25 a third attribute which is to display a prompt character string corresponding to the CLI command specified by the second attribute value, on a virtual terminal of the network device in order to transmit the CLI command;

a fourth attribute which indicates which prompt should be displayed on the virtual terminal of the network device after the CLI command is transmitted and executed;

30 a fifth attribute which specifies which character string is displayed on the virtual terminal of the network device when the result of executing the CLI command is a failure and determines whether the execution of the CLI command is a failure or a success; and

a sixth attribute which determines whether to execute a current CLI command when the execution of the previous CLI command is a failure.

16. The network management method of claim 15, wherein a CLI tag in
5 which all the CLI tag attributes are omitted is a pure aggregation tag (PAT) in
which subordinate CLI tags included in the PAT are capable of being
materialized more than once.

17. The network management method of claim 10, wherein step (b-3)
10 comprises:

(b-3-1) setting a variable value indicating a failure of the execution of
the CLI command to 'false' and setting variable i to the address value of a first
materialized CLI command;

15 (b-3-2) while the variable i indicates an effective command, waiting till a
predetermined prompt character string which is specified as the third attribute
value is transmitted from the network device;

(b-3-3) if the prompt character string is transmitted, transmitting the CLI
command to the network device; and

20 (b-3-4) if the network devices requests an additional input, transmitting
a predetermined additional character string.

18. The network management method of claim 17, wherein step (b-4)
comprises:

25 (b-4-1) when an error occurs as the result of the execution of the CLI
command, setting the variable value indicating a failure of the execution of the
CLI command to 'true'; and

30 (b-4-2) by considering the state of the variable value indicating a failure
of the execution of the CLI command and the branch location for a failure of the
execution of the CLI command, storing in the variable i the next address value
of a CLI command to be executed next.

19. The network management method of claim 11, wherein step (b-3) comprises:

(b-3-1) setting a variable value indicating a failure of the execution of the CLI command to 'false' and setting variable i to the address value of a first materialized CLI command;

(b-3-2) while the variable i indicates an effective command, waiting till a predetermined prompt character string which is specified as the third attribute value is transmitted from the network device;

(b-3-3) if the prompt character string is transmitted, transmitting the CLI command to the network device; and

(b-3-4) if the network devices requests an additional input, transmitting a predetermined additional character string.

20. The network management method of claim 19, wherein step (b-4) comprises:

(b-4-1) when an error occurs as the result of the execution of the CLI command, setting the variable value indicating a failure of the execution of the CLI command to 'true'; and

(b-4-2) by considering the state of the variable value indicating a failure of the execution of the CLI command and the branch location for a failure of the execution of the CLI command, storing in the variable i the next address value of a CLI command to be executed next.

21. The network management method of claim 12, wherein step (b-3) comprises:

(b-3-1) setting a variable value indicating a failure of the execution of the CLI command to 'false' and setting variable i to the address value of a first materialized CLI command;

(b-3-2) while the variable i indicates an effective command, waiting till a predetermined prompt character string which is specified as the third attribute value is transmitted from the network device;

(b-3-3) if the prompt character string is transmitted, transmitting the CLI command to the network device; and

(b-3-4) if the network devices requests an additional input, transmitting a predetermined additional character string.

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22. The network management method of claim 21, wherein step (b-4) comprises:

(b-4-1) when an error occurs as the result of the execution of the CLI command, setting the variable value indicating a failure of the execution of the CLI command to 'true'; and

(b-4-2) by considering the state of the variable value indicating a failure of the execution of the CLI command and the branch location for a failure of the execution of the CLI command, storing in the variable i the next address value of a CLI command to be executed next.

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23. The network management method of claim 13, wherein step (b-3) comprises:

(b-3-1) setting a variable value indicating a failure of the execution of the CLI command to 'false' and setting variable i to the address value of a first materialized CLI command;

(b-3-2) while the variable i indicates an effective command, waiting till a predetermined prompt character string which is specified as the third attribute value is transmitted from the network device;

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(b-3-3) if the prompt character string is transmitted, transmitting the CLI command to the network device; and

(b-3-4) if the network devices requests an additional input, transmitting a predetermined additional character string.

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24. The network management method of claim 23, wherein step (b-4) comprises:

(b-4-1) when an error occurs as the result of the execution of the CLI command, setting the variable value indicating a failure of the execution of the CLI command to 'true'; and

5 (b-4-2) by considering the state of the variable value indicating a failure of the execution of the CLI command and the branch location for a failure of the execution of the CLI command, storing in the variable i the next address value of a CLI command to be executed next.

25. The network management method of claim 14, wherein step (b-3) 10 comprises:

(b-3-1) setting a variable value indicating a failure of the execution of the CLI command to 'false' and setting variable i to the address value of a first materialized CLI command;

15 (b-3-2) while the variable i indicates an effective command, waiting till a predetermined prompt character string which is specified as the third attribute value is transmitted from the network device;

(b-3-3) if the prompt character string is transmitted, transmitting the CLI command to the network device; and

20 (b-3-4) if the network devices requests an additional input, transmitting a predetermined additional character string.

26. The network management method of claim 25, wherein step (b-4) comprises:

25 (b-4-1) when an error occurs as the result of the execution of the CLI command, setting the variable value indicating a failure of the execution of the CLI command to 'true'; and

30 (b-4-2) by considering the state of the variable value indicating a failure of the execution of the CLI command and the branch location for a failure of the execution of the CLI command, storing in the variable i the next address value of a CLI command to be executed next.

27. The network management method of claim 15, wherein step (b-3) comprises:

(b-3-1) setting a variable value indicating a failure of the execution of the CLI command to 'false' and setting variable i to the address value of a first materialized CLI command;

(b-3-2) while the variable i indicates an effective command, waiting till a predetermined prompt character string which is specified as the third attribute value is transmitted from the network device;

(b-3-3) if the prompt character string is transmitted, transmitting the CLI command to the network device; and

(b-3-4) if the network devices requests an additional input, transmitting a predetermined additional character string.

28. The network management method of claim 27, wherein step (b-4) comprises:

(b-4-1) when an error occurs as the result of the execution of the CLI command, setting the variable value indicating a failure of the execution of the CLI command to 'true'; and

(b-4-2) by considering the state of the variable value indicating a failure of the execution of the CLI command and the branch location for a failure of the execution of the CLI command, storing in the variable i the next address value of a CLI command to be executed next.

29. A computer readable medium having embodied thereon a program for the method of claim 9.